

definitions given we note a frequent lack of accuracy and precision, as, for example, with that of the Ophidia as having their "eyelids absent." The senior author's previous work explains the introduction of experimental observations of the antenniform-ophthalmite order, and brief note is taken of "variation" and abnormality. The social life and "language" of ants, protective resemblance and mimicry among the Lepidoptera, the habits of the spiders, and many other similarly fascinating topics receive in due course passing consideration. The reader will put down the book feeling the better for its perusal and with a desire to know more, while its "keys" to the identification of the common forms of life, oft overlooked because always present, but withal foremost in their claims on our attention, will prove useful and encouraging. We are doubtful, however, whether the authors would not have done better to have attempted less and that more uniformly, and whether they are justified in their refrain that in matters of elementary scientific education the mere "needs" of the ordinary citizen are to be alone gratified. We are by no means convinced that this argument is sound. Their method would seem likely to discount the teacher's important function of deciding what is to be left untaught—a matter of the utmost urgency in elementary scientific work. We shall watch with interest the development of their scheme.

COLOUR PHOTOGRAPHY.

A Handbook of Photography in Colours. By Thomas Bolas, Alexander A. K. Tallent and Edgar Senior. Pp. viii + 343. (London: Marion and Co., 1900.)

THE preface or introduction is written by the publishers, and is immediately followed by an index. Then follow three "sections." (1) 85 pages, by Mr. Bolas, on the "Historical Development of Heliography. General Survey of Processes. Direct Heliography on Silver Chloride." (2) 205 pages, by Mr. Tallent, on "Three-colour Photography." (3) 27 pages, by Mr. Senior, on "Lippmann's Process of Interference Heliography." Each section is quite distinct from the others, except that they are bound into one volume and indexed together; there is therefore much repetition. For example, Maxwell's colour-sensation curves and Abney's revised curves are each given twice (the two renderings, by the way, are not identical), and Lippmann's formula for his emulsion is given at p. 55 and also at p. 332. Careful editing would have avoided such waste of space. Some of the diagrams are drawn with exceedingly thick lines, and are provided with very large heavy lettering, while others incline rather in the opposite direction. Some of the spectra as drawn for showing absorption, sensitiveness and so on, have the red to the left, and others the red to the right-hand side; some are normal, and others are as produced by prisms. It may be said that these are quoted from various sources; but in a volume in which it is thought necessary to explain with a large diagram the refraction of light on passing from air into water, surely a little explanation of these differences is desirable. At p. 180, a spectrum which is normal is described as "prismatic." The volume appears not to have been edited at all, therefore the only way to

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do justice to the authors is to regard it as three distinct books.

Mr. Bolas gives an excellent summary of the whole subject, both historical and practical. As a careful compiler should do, he has erred, if it be an error, in including too much rather than too little. Carey Lea's highly coloured partial reduction products of the halogen salts of silver might have been passed by, by some writers, as well as other references to conjectures. Zenker's work and Wiener's investigations are described intelligibly, although concisely; indeed, the author has evidently spared no pains to give every one his due, and to use to the best advantage the small space at his disposal.

Mr. Tallent begins his section with several pages on the properties of light and the construction of ordinary spectroscopes—matter which, we think, might well have been omitted in order to make room for the treatment of subjects for which the reader is often referred to other books or articles. The peculiar firework-like diagram at p. 112, given to illustrate dispersion, is more likely to mislead than assist the student; and some of the other diagrams might have been made more clear, in spite of the extraordinary boldness of the drawing and lettering. Mr. Tallent has gathered together a great deal of information about three-colour work, which he presents in the form of notes rather than as a treatise. It is doubtless advantageous in some cases to supply the raw material only, but the possession of bricks and mortar does not enable every one to build himself a house. If the very popular style of description sometimes adopted were given up in favour of more technical details, and if the practical applications of the various principles were more closely associated with the enunciation of the principles themselves, we think that the book would be more useful to the large majority of those who will read it. But we must be grateful to Mr. Tallent for having made a beginning in the getting together of the hitherto widely scattered items of the subject. His work must be of considerable assistance to any one following him, and we hope that later on he himself may be able to give us a treatise founded on these notes.

Mr. Senior treats only of Lippmann's interference process, and he writes on this with authority, for he has given the matter much practical attention, and has produced some of the best examples that have been seen. He gives his formulæ and methods apparently without any reserve, as well as the published formulæ of other notable workers. He precedes the practical details with a few pages on the optical principles involved, setting forth clearly the character of "stationary waves." We think that most people reading p. 323 would consider it as showing that the colours reflected from a Lippmann photograph are complementary to those of the objects photographed, but it is quite obvious that Mr. Senior does not intend to convey this impression.

The publishers, in their preface, state that thirty-one years ago they published the pioneer work on photography in colours (by Ducos du Hauron), and they feel satisfaction now in following up the line they "opened up over a quarter of a century ago." All who are interested in the subject will feel thankful to Messrs. Marion and Co. for having done so.

C. J.